
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Evaluate Bull Trout Population Status/N.F. Clearwater R. - Npt & Idfg

BPA project number: 20557

Contract renewal date (mm/yyyy): ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding

Nez Perce Tribe / Idaho Department of Fish and Game -- UMBRELLA

Business acronym (if appropriate) NPT

Proposal contact person or principal investigator:

Name	<u>Dana Weigel</u>
Mailing Address	<u>3404 Hwy 12</u>
City, ST Zip	<u>Orofino, ID 83541</u>
Phone	<u>(208) 476-9502</u>
Fax	<u>(208) 476-0719</u>
Email address	<u>weigeld@clearwater.net</u>

NPPC Program Measure Number(s) which this project addresses

10.1C.3, 10.3C.6, 10.1C.1

FWS/NMFS Biological Opinion Number(s) which this project addresses

Other planning document references

Section 6.6.5.3.A of the Resident Fish Multi-Year Implementation Plan for the Lower Snake Subregion (CBFWA 1997) calls for the need to ensure population levels of native fish in Dworshak and its tributaries are above minimum viable population size. Two documents evaluating the resident fish mitigation program in Dworshak Reservoir have identified the need for life history, habitat use, and effects of Reservoir operations on bull trout in the NF Clearwater basin. These studies also discuss the predator – prey relationship between introduced kokanee salmon and bull trout, and the beneficial effects of enhancing the kokanee populations on bull trout (Bennett 1997; Fickeisen and Geist 1993). The State of Idaho Bull Trout Conservation Plan (Idaho of Idaho 1996) and IDGF's Mangement Plan (IDFG 1996) also address the need for bull trout protections.

Short description

Evaluate distribution, habitat use, and movement patterns of bull trout (*Salvelinus confluentus*) in the N.F. Clearwater River drainage, including Dworshak Reservoir.

Target species

Bull trout (*Salvelinus confluentus*)

Section 2. Sorting and evaluation**Subbasin**

Clearwater

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input type="checkbox"/> Anadromous fish <input checked="" type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20557	Evaluate Bull Trout Population Status / N.F. Clearwater River - NPT & IDFG
20147	Evaluate Bull Trout Population Status / N.F. Clearwater River - NPT
20148	Evaluate Bull Trout Population Status / N.F. Clearwater River - IDFG

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9501600	Genetic Inventory Westslope Cutthroat Trout	Assessment of a native trout species in N.F. Clearwater River Drainage-- has identified distributions of bull trout in the basin and collected incidental observations on habitat

		use, developed methodologies to collect habitat and fish data in the basin.
8740700	Dworshak Impacts/M&E and Bio-Int Rule Curves	Assessment of reservoir operations on fish populations in Reservoir-- has compiled baseline data on fish distribution in the reservoir and identified temperature and oxygen conditions that could act as barrier to migration into upper basin.
8709900	Dworshak Impacts Assessment	Assessment of entrainment- identified the needed to assess the potential and impact of entrainment on reservoir fish associated with operations.
9405400	Bull Trout Studies in Central and N.E. Oregon	Study methods and protocols between studies are similar, and thus comparison between basins may lead to identification of regional patterns.

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Identify bull trout subpopulations and determine the status of the bull trout subpopulations in the North Fork Clearwater River.	a	Tag juvenile and adult bull trout in the reservoir and throughout the North Fork Clearwater River basin and observe movements and spawning behaviors.
		b	Observe temporal habitat use (i.e., spawning, early rearing, wintering) and critical migratory corridors. Define spawning, early rearing, and winter habitat characteristics. Define critical migratory corridors.
		c	Determine distribution of bull trout

			(presence/absence). Estimate population structure (YOY densities). Conduct redd counts and identify breeding individuals. Assess condition and growth
2	Identify how Dworshak Reservoir and operations affect bull trout.	a	Track bull trout use of Reservoir.
		b	Identify movement in and out of the reservoir -seasonal trends, use of migratory corridors.
3	Develop and implement strategies to protect and perpetuate bull trout populations in the North Fork Clearwater River drainage.	a	Coordinate with other sponsored projects in the North Fork Clearwater River drainage to determine risks to bull trout subpopulations
		b	Implement strategies identified in Task 3a.
		c	Monitor and evaluate strategies implemented.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	1/2000	12/2005	Identification of populations and population viability	Completion of data collection phase	50.00%
2	1/2000	12/2005	Identification of reservoir use and effects on populations viability	Completion of data collection phase	50.00%
3	6/2005	12/2005	Development of strategies to protect and perpetuate bull trout	Assessment of risks to the populations	
3	1/2006		Implementation, evaluation, and monitoring	Viable bull trout populations	
				Total	100.00%

Schedule constraints

Initiation of bull trout data collection is dependent on acceptance and approval of study plan and design by USFWS. A study plan and design will be submitted following ESA permit guidelines in 1999 to start fieldwork as scheduled in 2000.

Completion date

The initial data collection phase of proposed project will be completed in 2005.

Section 5. Budget

FY99 project budget (BPA obligated): \$0

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	see IDFG & NPT subproposals	%0	0
Fringe benefits		%0	0
Supplies, materials, non-expendable property		%0	0
Operations & maintenance		%0	0
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	0
NEPA costs		%0	0
Construction-related support		%0	0
PIT tags	# of tags:	%0	0
Travel		%0	0
Indirect costs		%0	0
Subcontractor		%0	0
Other		%0	0
TOTAL BPA FY2000 BUDGET REQUEST			\$ 0

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
	see IDFG subproposal	%0	
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			\$ 0

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget				

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	Allendorf, F.W. and R.F. Leary. 1988. Conservation and distribution of genetic variation in polytypic species, the cutthroat trout. <i>Conservation Biology</i> . 2:170-184.
<input type="checkbox"/>	Bennett, D.H. 1997. Evaluation of current environmental and conditions and operations at Dworshak Reservoir, Clearwater River, ID and an analysis of fisheries mitigation alternatives. Final Report to the Army Corp of Engineers. Walla Walla, WA.
<input type="checkbox"/>	Bisson, P.A. and others. 1998. Report of the Independent Scientific Review Panel. ISRP 98-1. Report to Northwest Power Planning Council. Portland, OR
<input type="checkbox"/>	Bjornn, T.C., and J. Mallet. 1964. Movement of planted and wild trout in an Idaho river system. <i>Transactions of the American Fisheries Society</i> 93:70-76.
<input type="checkbox"/>	Carl, L. 1985. Management plan for bull trout in Alberta. In: MacDonald, D.D., ed. <i>Proceedings of the Flathead River basin bull trout biology and population dynamics modeling information exchange</i> . Cranbrook, BC: British Columbia Ministry of Environment.
<input type="checkbox"/>	Cannon, W. 1970. Dworshak Fisheries Study. Idaho Department of Fish and Game. Annual Report DSS 29. Lewiston, ID
<input type="checkbox"/>	Columbia River Basin Fish and Wildlife Authority. 1997. Draft multi-year implementation plan for resident fish protection, enhancement, and mitigation in the Columbia River Basin. CBFWA Tech. Planning Document. Portland, OR
<input type="checkbox"/>	Cramer, S.P., C.W. Huntington, and C.R. Steward. 1993. Harvest of Anadromous Fisheries Lost by the Nez Perce Indian Tribe as a Result of the Lewiston and Harpster Dams in the Clearwater Basin. S.P. Cramer and Associates. Gresham, OR.
<input type="checkbox"/>	Fickeisen, D.H. and D.R. Geist. 1993. Resident fish planning Dworshak Reservoir, Lake Roosevelt, and Lake Pend Oreille. Project No. 93.026. Bonneville Power Administration, Portland, OR. 45pp.
<input type="checkbox"/>	Idaho Department of Fish and Game. 1996. Idaho Department of Fish and Game's fish management plan 1996-2000. Boise, ID.
<input type="checkbox"/>	Lindland, R.L. 1987. Idaho Department of Fish and Game Regional Fish Management Investigations. F-71-11. Lewiston, ID.
<input type="checkbox"/>	Northwest Power Planning Council. 1994. Columbia River Basin Fish and Wildlife Program. Report 94-48. Portland, OR.
<input type="checkbox"/>	Pratt, K.L. 1992. A review of bull trout life history. In: Howell, P.J. and D.V. Buchanan eds. <i>Proceedings of the Gearhart Mountain bull trout workshop</i> . (August) Oregon Chapter, American Fisheries Society, Corvallis, OR
<input type="checkbox"/>	Ratliff, D.E., and Howell, P.J. 1992. The status of bull trout populations in Oregon. In: Howell, P.J.; Buchanan, D.V., eds. <i>Proceedings of the Gearhart Mountain bull trout workshops; 1992 August; Gearhart Mountain, OR</i> . Corvallis, OR.

<input type="checkbox"/>	Schriever, E. and T. Cochnauer. 1996. Idaho Department of Fish and Game Regional Fish Management Investigations. F-71-R-17. Lewiston, ID
<input type="checkbox"/>	Shepard, B., K. Pratt, and P. Graham. 1984. Life histories of westslope cutthroat and bull trout in the upper Flathead River basin, Montana. Kalispell, MT: Montana Department of Fish and Wildlife, and Parks. 85 p.
<input type="checkbox"/>	State of Idaho. 1996. Governor Batt's Bull trout conservation plan. Office of the Governor. Boise, ID
<input type="checkbox"/>	Statler, D.P. 1988. Dworshak Reservoir investigations – Trout, bass and forage species. Annual Report to BPA, Contract No. De-A179-87B35165. Nez Perce Department of Fisheries Resource Management. Orofino, ID

PART II - NARRATIVE

Section 7. Abstract

Little information is known about bull trout *Salvelinus confluentus* in the North Fork Clearwater River drainage. Surveys conducted by the Idaho Department of Fish and Game, Nez Perce Tribe, and other agencies have documented these fish in several streams in the drainage and in Dworshak Reservoir. However, the role Dworshak Dam and reservoir play in the life history of bull trout in the North Fork is unknown. Section 10.1C of the Councils Fish and Wildlife Program empowers fisheries managers to complete assessments of resident fish losses and gains related to the construction of each hydropower facility throughout the Columbia River Basin, and BPA to fund the completion of these resident fish assessments and identify the need for mitigation actions. As co-managers, the Nez Perce Tribe and Idaho Department of Fish and Game have identified the need to assess the losses and/or gains of bull trout in the North Fork Clearwater River related to the construction and operation of Dworshak Dam and associated reservoir. Baseline information on bull trout populations in the North Fork Clearwater River that is needed to assess the effect of the construction and operation of Dworshak Dam and Reservoir and develop strategies to protect and perpetuate the population(s) does not exist. We propose collecting bull trout movement and life-history information in the North Fork Clearwater River and Dworshak Reservoir over the next five years to assess 1) the role Dworshak Reservoir plays in movement patterns throughout the drainage, 2) the status (viability) of bull trout population(s) in the drainage system, and 3) the need for additional mitigative actions. Radiotags will be inserted in bull trout captured both in the reservoir and selected streams upstream of the reservoir. The movement of these fish, and information on the distribution and population structure of bull trout in the upper basin will be used to identify subpopulations, critical habitat, how, when and where bull trout use Dworshak Reservoir, and if use of the reservoir affects population viability.

Section 8. Project description

a. Technical and/or scientific background

In 1971 the construction of Dworshak Dam was completed near the mouth of the North Fork Clearwater River. The 218 m high dam inundates >100 km of riverine habitat on the mainstem of the North Fork Clearwater River and its tributaries. With no passage for fish migration the impacts to anadromous fish have been significant. It is estimated that approximately 33 percent of the spring Chinook *Oncorhynchus tshawytscha* and steelhead trout *Oncorhynchus mykiss* and 20 percent of the fall Chinook production in the Clearwater Basin have been lost as a direct result of the construction and operation of Dworshak Dam (Cramer, Huntington, and Steward 1993). Impacts on other native species in the basin are not as clear.

It is assumed that the construction of Dworshak Dam has significantly reduced the distribution, abundance, and population viability of native fish populations in Dworshak Reservoir and its upstream tributaries (CBFWA 1997). Information that is needed to assess this assumption however does not exist.

Historically bull trout *Salvelinus confluentus* have been observed throughout the North Fork Clearwater River basin. Bull trout were found throughout the basin prior to construction of Dworshak Dam (Cannon 1970). Bull trout are still found in many of the streams documented in the earlier studies and in Dworshak Reservoir (Lindland 1987, Statler 1989, Schriever and Cochnauer 1996, Weigel *unpublished data*). Predicting changes in the bull trout population(s) in the basin is difficult because of the lack of pre- and post-dam data, or comparable control bull trout population(s) in basins without dam and reservoir influences, on bull trout abundances and distributions. As a result, it we feel direct assessment of loss is not feasible. But, assessment of the viability of current populations remaining in the basin, and determining whether their viability and movements of trout are affected by current or potential operations of Dworshak Dam and associated reservoir will help provide the information needed to assess the need for and determine strategies to protect and perpetuate bull trout population(s) in the North Fork Clearwater basin. A minimum viable population size has been defined as one which maintains adaptability and genetic diversity, and maximizes probability of survival, with a minimum breeding population of 150-300 individuals and >95 percent probability of persistence for ≥ 5 generations (CBFWA 1997).

Although bull trout have been observed and collected throughout the basin, little information is available on their life history or distribution. More importantly, other than documenting presence or absence, no information is available regarding the role Dworshak Reservoir plays in the life history and distribution of bull trout in the drainage. Bull trout exhibit a number of life history forms (i.e., resident, fluvial and adfluvial). All life history forms can coexist within a basin. Resident bull trout spend their entire life cycle within a single headwater tributary stream and, relative to fluvial and adfluvial forms, are small in size. Fluvial and adfluvial bull trout move extensive distances, sometimes exceeding 200 miles (Bjornn and Mallet 1964). Juvenile adfluvial fish spend one to three years in the tributaries before moving to lakes where they reside for one to three years before they return to natal streams to spawn (Pratt 1992). Fluvial forms are similar to adfluvial fish, but grow and mature in large streams and rivers. Both adfluvial and fluvial forms can attain lengths up to 700 mm (Shepard *et al.* 1984). We hypothesize that fluvial populations in the basin may either use the large mainstem river or reservoir and that populations closer to the reservoir may be more affected by the alteration of the

riverine habitat than populations farther away. If viability of the population(s) is associated with reservoir use and operations the effects of Dworshak Dam on populations in the basin may differ.

Seasonal thermal and chemical barriers in the upper reaches of the reservoir, which may disrupt migration of bull trout to the upper basin have been identified (Stalter unpublished data). In August of 1994 and 1998 when pool levels were dropped to a low, water column temperature and dissolved oxygen levels reached lethal levels for bull trout in the upper portions of the reservoir. The impacts on migration and viability of bull trout populations were not assessed, but we hypothesize that if these barriers develop and block the spawning migration impacts to population viability could be significant.

By 1) determining movement patterns and how bull trout use the reservoir, mainstem North Fork, and tributaries and 2) assessing bull trout population(s) status, and how current Dworshak Dam and Reservoir operations influence movements and population(s) viability, we feel we will be able to develop and implement strategies to protect and perpetuate bull trout populations in the North Fork Clearwater River drainage.

b. Rationale and significance to Regional Programs

The Northwest Power Council Fish and Wildlife Program acknowledges the impacts of hydropower development on anadromous and native fish populations in the Columbia River Basin (NPPC 1995). The Council's program identifies the needed to: 1) protect, mitigate and enhance resident fish populations to the extent they were or are affected by construction and operation of dams, and 2) protect, mitigate and enhance resident fish in hydropower system storage projects to the fullest extent practicable from negative impacts associated with water releases. A priority of the Council's program is to rebuild to sustainable levels weak, but recoverable, native populations injured by the hydropower system, when such populations are identified by the resident fish managers.

The resident fish managers have specifically identified the need to assess the impacts of the construction and operation of Dworshak Dam on native species (e.g., bull trout, cutthroat trout) in the Lower Snake Subregion (CBFWA 1997). Section 6.6.5.3 of the Resident Fish Multi-Year implementation Plan identifies the need to: 1) maintain and restore bull trout and cutthroat population productivity reduced by the development and operation of Dworshak Dam to healthy levels, and 2) ensure that native populations are above minimum viable population sizes which maintain adaptability and genetic diversity, and maximum probability of survival (CBFWA 1997).

The Council and the resident fish managers have included specific measures and strategies in their programs to maintain, protect and restore resident fish populations impacted by hydropower. Section 10.1C of the Council's Fish and Wildlife Program (NPPC 1995) empowers fisheries managers to complete assessments of resident fish losses and gains related to the construction of each hydropower facility throughout the Columbia River Basin. And, to fund the completion of these resident fish assessments and identify the need for mitigation actions with prompt action forestalling Endangered Species Act listing for several species including bull trout and westslope cutthroat (NPPC 1995).

For native fish species (bull trout and cutthroat trout) in Dworshak and the associated upstream North Fork Clearwater River watershed, the resident fish managers program identifies the need to: 1) identify and estimate the status of populations and groups of populations 2) identify factors limiting each population, critical habitat or conditions which limit life stages, and population sizes, and 3) select and implement measures based on distribution, status, and limiting factor assessments to improve habitat conditions, restore genetic integrity and connectivity between isolated subpopulation.

Although the Council and the resident fish managers agree that basinwide reviews of resident fish populations are needed these reviews have not yet been initiated in most basins. Baseline inventory information on native fish stocks in the Columbia Basin is lacking in most basins. Basinwide inventories of remaining native fish populations and their status are needed to identify opportunities to restore and rebuild native resident fish populations and to set priorities (Bisson 1998).

In 1998, bull trout was listed as endangered. As co-managers, the Nez Perce Tribe and Idaho Department of Fish and Game have identified the need to assess the losses and/or gains of bull trout in the North Fork Clearwater River related to the construction of Dworshak Dam. The baseline information on bull trout populations in the North Fork Clearwater River that is needed to assess the effects of the construction and operation of Dworshak Dam and Reservoir and develop strategies to protect and perpetuate the population does not exist. General information describing the movement of bull trout in the North Fork Clearwater River drainage, and their life history relationship to Dworshak Reservoir is critical in assessing the need to: 1) maintain and/or restore complex interacting groups of bull trout populations throughout the drainage, 2) maintain the conditions of those areas presently supporting critical bull trout habitat, and 3) institute recovery strategies that produce measurable improvement in the status, abundance, and habitats of bull trout that have been adversely affected by the construction and operation of Dworshak Dam.

c. Relationships to other projects

In the North Fork Clearwater River little work has been done to quantify the impacts of the construction and operations of Dworshak Dam on resident fish. While BPA is funding projects on Dworshak Reservoir addressing the impacts to resident fish species, no work has been directed to bull trout.

In 1995, the Nez Perce Tribe began documenting the extent of hybridization between native westslope cutthroat trout and hatchery rainbow trout stocked in Dworshak Reservoir (9501600). Hybridization with exotic trout is considered the greatest threat to the conservation of the native westslope cutthroat trout in northern Idaho (Allendorf and Leary 1988). Distributions of pure and hybridized westslope cutthroat trout have been identified using nuclear DNA analysis in the North Fork Clearwater basin. Information on habitat use and spawning locations of westslope cutthroat has also been recorded. Incidental observation of habitat use and spawning locations, along with genetic samples have also been recorded and collected for bull trout during this study. This information will be used to identify study populations of bull trout and critical habitat areas. This project will also complement two other ongoing projects, Dworshak Dam Impacts Assessment and Fisheries Investigation (8709900) and Dworshak Impacts/M&E

Biological-Integrated Rule Curves (8740700) which are assessing the effects of Dworshak operations on reservoir production and the fishery. Strategies for reservoir operations should not be considered without a full understanding of risks to endangered species present. Data collected on effects of Dworshak operations on bull trout viability should be considered in the development of rule curves and strategies to minimize entrainment losses from the reservoir.

d. Project history (for ongoing projects)

There is no past history through this funding source.

e. Proposal objectives

Specific tasks associated with each objective are linked to the co-manager (*NPT or IDFG*) responsible for its implementation and completion.

Biological Objective: Ensure population levels of bull trout in the North Fork Clearwater River are above minimum viable population sizes which maintain adaptability and genetic diversity, and maintain a minimum breeding population of 150-300 individuals with >95 percent probability of persistence for ≥ 5 generations.

Assumptions: The construction and operation of Dworshak has significantly affected the distribution, abundance, and population viability of native populations of bull trout in Dworshak Reservoir and its tributaries. Native populations of bull trout in Dworshak and its tributaries can be enhanced by improvements in Dworshak operations. Habitat upstream is suitable for bull trout spawning and rearing.

Objective 1. Identify bull trout subpopulations and determine the status of the bull trout subpopulations in the North Fork Clearwater River.

Assumptions: A number of subpopulations are present in the North Fork Clearwater River. Effects of Dworshak on individual subpopulations may differ. Individual subpopulations can be identified and distinguished by spawning locality and behavior (homing/straying), or associated with life history attributes of the population.

Hypotheses:

Ho₁: Breeding subpopulations in the North Fork are not distinguished by spawning locality and behavior, or life history attributes of the subpopulation.

Ha₁: Breeding subpopulations in the North Fork Clearwater River are distinguishable by spawning locality and behavior, or life history attributes of the subpopulation.

Ho₂: All subpopulations are not viable, breeding population(s) of a minimum of 150-300 individuals.

Ha₂: All or some subpopulations are viable, breeding population(s) of a minimum of 150-300 individuals.

Task 1. Tag juvenile and adult bull trout in the reservoir and throughout the North Fork Clearwater River basin and observe movements and spawning behaviors. (*NPT: Long*

term movements of juvenile and adult fish in upper basin. IDFG: Seasonal movement of adults in reservoir and upper basin).

Product: Identify population interactions, population attributes, and define sub-populations in the basin.

Task 2. Observe temporal habitat use (i.e., spawning, early rearing, wintering) and critical migratory corridors. Define spawning, early rearing, and winter habitat characteristics. Define critical migratory corridors. (*NPT: Upper basin. IDFG: Reservoir*).

Product: Identify critical bull trout habitat.

Task 3. Determine distribution of bull trout (presence/absence). Estimate subpopulation structure (YOY densities). Conduct redd counts and identify breeding individuals. Assess condition and growth (*NPT*).

Product: Status of subpopulation viability (measured as 150-300 breeding individuals per population throughout basin CBFWA 1997).

Objective 2. Identify how bull trout use and are affected by Dworshak Reservoir and operations.

Assumptions: Reservoir use by bull trout varies seasonally among age classes and subpopulations. Use of the reservoir by bull trout effects (either positive or negative) bull trout subpopulation(s) viability.

Hypothesis:

Ho: Reservoir habitat/use is not critical to bull trout. Use is not associated with subpopulation viability.

Ha: Reservoir habitat is critical to bull trout. Use (seasonal, age class or population use) is associated with either negative or positive changes in subpopulation viability.

Task 1. Track bull trout use of Reservoir. (*IDFG*)

Product: Determine relative use of reservoir by subpopulations and its affect on subpopulation viability. Identify movement in and out of the reservoir -seasonal trends, use of migratory corridors.

Task 2. Monitor thermal barriers and relate to seasonal movements. (*IDFG*)

Products: Identify seasonal (operational effects) on movement/use, blockage of migratory corridors.

Objective 3. Develop and implement strategies to protect and perpetuate bull trout populations in the North Fork Clearwater River drainage.

Assumptions: Bull trout populations are affected by the management and operation of Dworshak Reservoir. Specific management and operation strategies can be identified and implemented to protect and perpetuate bull trout subpopulations in the drainage.

Task 1. Coordinate with other sponsored projects in the North Fork Clearwater River drainage to determine risks to bull trout subpopulations. (*IDFG and NPT*)

Product: Assessment of risks to bull trout subpopulations in the drainage.
Identification of management and operational strategies to minimize risks.

Task 2. Implement strategies identified in Task 1. (*IDFG and NPT*).

Product: Protection and perpetuation of the bull trout subpopulations in the North Fork Clearwater River drainage.

Task 3. Monitor and evaluate strategies implemented. (*IDFG and NPT*)

Product: Evaluation of need for continuing protection and perpetuation of the bull trout subpopulations in the North Fork Clearwater River drainage.

f. Methods

Methods associated with each objective and task are linked to the co-manager (*NPT or IDFG-see above*) responsible for its implementation and completion. See sub-contracts submitted by Nez Perce Tribe and Idaho Department of Fish and Game for methods.

g. Facilities and equipment

Idaho Department of Fish and Game's field crew will be stationed at IDFG's Clearwater Region Office in Lewiston, ID. The Nez Perce Tribe's fishery personnel will be located at the Orofino, Tribal Fisheries Field Office. Specifics on the facilities and equipment are described in detail in individual sub-proposals.

h. Budget

Budgets and budget justifications are presented in sub-proposals submitted by Nez Perce Tribe and Idaho Department of Fish and Game.

Section 9. Key personnel

Key personnel and their qualifications are listed in individual sub-contracts submitted by Nez Perce Tribe and Idaho Department of Fish and Game.

Section 10. Information/technology transfer

Data collected by NPT and IDFG will be included into a common database annually. Although data collection, analysis, and some interpretation of the data will be done separately, the project has been designed in coordination. Data collected by both managers will be needed to fully assess impacts to bull trout populations. Key personnel from each project will maintain a continuing dialog. Annual data reviews will be conducted and used to by co-managers to revise study plans to insure project objectives are met.

The information collected will also be presented in quarterly and annual reports to the funding agency. Overall significant findings will be submitted for publication in appropriate refereed professional journals. The principal investigator will present findings annually to fishery agencies, professional groups or as requested.

Congratulations!